

This report describes the results of the 1998-99 Monitoring Program that was conducted in compliance with the Program's NPDES Municipal Stormwater Permit No. CAS614004. Elements of the Monitoring Program consisted of land use station monitoring, mass emission station monitoring, and the Critical Source/BMP Monitoring Study. The Critical Source/BMP Monitoring Study is an ongoing study that is scheduled to be completed in the 2000-2001 storm season. The following are the principal conclusions and recommendations from this work.

5.1 OBJECTIVES ACHIEVED IN 1998-99

The land use monitoring was conducted at eight stations and included flow composite sample data collected during 77 station events up to April 11, 1999. The mass emission monitoring was conducted at 5 stations and consisted of 59 station events. Some grab sample data were also obtained at the mass emission stations. Generally, sampling activities were conducted according to plan, and attempts were made to capture as many storms as possible.

Monitoring at the land use stations and mass emission stations included a broad constituent suite including bacteria, metals, organics, major ions, and nutrients. The laboratory analytical efforts achieved detection limits (DL) as required by the Permit for all constituents, and achieved DLs that were lower than Permit requirements for many analytes, particularly for constituents of concern. Lower DLs are beneficial for two reasons: 1) to increase the probability of detection of potentially harmful substances at the concentrations of concern, and 2) to enhance the information value of the data by improving the quality of the data sets and allowing for more rigorous statistical analyses and data interpretation techniques. Thus, the major objective of runoff characterization at mass emission and land use catchments was achieved.

5.2 MASS EMISSION PROGRAM CONCLUSIONS

Stations that peaked in a certain parameter in 1998-99 did not necessarily peak in the five-year data set. Different parameters peaked at different stations, both in the one-year and the five-year datasets. In other words, there was no apparent trend of "cleaner" versus "less clean" watersheds. There were several individual exceedances of water quality objectives, either of the California Toxics Rule or of the Ocean Plan (or of both), for total metals; however, the only heavy metal that had a seasonal mean or median exceed an objective was dissolved copper. Further, except for dissolved copper, there were very few individual exceedances of dissolved metals, which are the form of heavy metal that are considered bioavailable (and therefore potentially toxic).

Total coliforms and fecal bacteria (fecal coliforms, fecal streptococcus, and fecal enterococcus) were detected in all samples tested. Densities observed during the first storm of each rainy season were not necessarily higher than during consecutive storm events, suggesting that there was no apparent "first-flush" effect in these watersheds. Except for somewhat lower densities at Malibu Creek, there was no seasonal or regional consistency in cell densities. Dry weather flows contained bacteria at much lower densities (three to four orders of magnitude lower) than wet weather flows.

5.3 LAND USE PROGRAM CONCLUSIONS

Runoff from the vacant catchment had high pH and high alkalinity, while runoff from the light industrial, transportation, and mixed residential stations had lower median pH values and lower median alkalinity concentrations. The commercial station fell in between these two extremes. Median hardness concentrations follow the alkalinity pattern: high at the vacant station; low in the light industrial, transportation, and mixed residential stations; and in between at the commercial station.

TSS results overlapped substantially among the different land uses, however the range of values was larger for the mixed family residential, commercial, and light industrial stations in the 1998-99 season. The light industrial station had the highest mean and median for TSS being approximately twice as high as the next highest mean and median for multi-family residential.

Total and dissolved copper concentrations overlapped among the different land uses, however the range of values was larger for the transportation station in the 1998-99 season. The cumulative pattern is similar except that larger ranges are observed at both the light industrial and transportation stations for total copper. Total lead results are fairly consistent among land uses both in the 1998-99 season and cumulatively with a couple of higher observations at the commercial and light industrial stations. Dissolved and total zinc exhibit similar patterns for both the 1998-99 season and the cumulative data.

Bis(2-ethylhexyl)phthalate was observed at all land use stations over time. The vacant and multi-family residential stations had higher means than other stations this season, but cumulatively observations overlap substantially. Means and medians for all stations exceed the Ocean Plan standard in the cumulative data set.

5.4 CRITICAL SOURCE PROGRAM CONCLUSIONS

The highest total and dissolved cadmium concentrations were found at the auto dismantler sites and were below the concentrations found at the mass emission sites. On the other hand, the highest concentrations of total and dissolved copper, total and dissolved lead, dissolved zinc, and aluminum was found at the fabricated metal sites. Dissolved copper and both total and dissolved zinc concentrations were higher at the fabricated metals sites than the mass emission and CIT sites.

The highest TSS values were observed at auto repair sites followed by auto dismantlers and fabricated metals, and exceeded mass emission. The highest TDS concentrations were found at auto dismantler sites followed by fabricated metal and auto repair sites, and were lower than the CIT levels. The highest specific conductance results were observed at the auto dismantler sites, while the lowest were observed at the auto repair sites. Compared with mass emission and CIT results, the current results fell far below the mean value of 748 umhos/cm.

Total organic carbon was highest at auto repair sites during the 1998-99 storm season which was higher than both the current mass emission and CIT maximum. This season's mean value is also higher than that of 1997-98. The highest concentrations of COD were also found at auto repair sites.

From all the samples tested for SVOCs, only bis(2-ethylhexyl)phthalate was detected. The highest level was 23.6 ppb, lower than 1997-98's highest level of 52.8 ppm. The highest MBAS

level was observed this season at the auto repair sites, which is less than the 1997-98 mean. MBAS generally originate from surfactants; the soaps and detergents used in site and parts cleaning. The non-exceedence levels of the critical source study sites could indicate voluntary good housekeeping efforts of the owners.

5.5 RECOMMENDATIONS

The Permit states that if a given constituent is not detected in at least 25% of the samples taken in ten consecutive storm events at a given station then that constituent may qualify for removal from the analytical suite for the associated station. For both mass emission and land use stations several constituents met this criterion (see Tables 4-6 and 4-20). It is recommended that these constituents be removed from the analytical suite for the associated stations.

The Permit allows the discontinuation of monitoring at a land use station for specific constituents once the event mean concentration (EMC) is derived at the 25% error rate. We used the mean standard error as a substitute for error rate as mutually agreed upon with the RWQCB (Swamikannu, 1999).

Of 115 station-constituents under investigation, 39 of them had an EMC with a mean standard error higher than 25%. In other words, there were 39 station-constituents which had a standard error (standard deviation of the mean) larger than 25% of their corresponding mean concentrations. These station-constituents must continue to be monitored under the current Permit. The remaining 76 station-constituent combinations met the criterion and it is recommended that monitoring be discontinued for these constituents at the associated stations.

Constituents for specific stations summarized in Table 5-1 meet either one or both of the following criteria: 1) any constituent detected in less than 25% of ten consecutive samples for a given station, 2) one of a specific list of analytes with a mean standard error of less than 25% for a given land use station. Monitoring for these constituents (Table 5-1) is recommended to be discontinued for the associated stations.

The Best Management Practices that will be installed for the auto dismantling and auto repair companies for the 1999-2000 storm season will be of the preventive type. For example, they will include methods to keep raw, finished, and waste materials off the ground, sheltered from the rain, or stored in protective enclosures. They will also include spill containment and cleanup practices. As such, they are expected to prevent pollutants from entering the storm drain system. Therefore, the concentrations of total and dissolved metals, total suspended and dissolved solids, oil and grease, TPH, specific conductance, and COD should be reduced.

The BMPs for fabricated metal companies in the 1999-2000 storm season will be similar in nature to those being installed at the auto dismantling and repair companies but may also include structural, treatment type BMPs. At the time of the writing of this report, a final decision has not been made. Factors affecting the decision include the results of a technical evaluation of the treatment methods, the funding available, the time available to install, and the feasibility of their being installed at other businesses when this study is over.